# Matthias **Lehmann**

PHD STUDENT

*Cologne, Germany*

📱 (+49) 1639685831 | ✉ ytflehmann.matt@gmail.com | 🏠 matt00n.github.io | Matt00n | in matthias-lehmann-64a688139

## Research Interests

Generalist Agents, Deep Reinforcement Learning & Applications, AI for Mathematics, Open-Ended Learning, Human-in-the-Loop Systems

## Education

### Ph.D. in Business Administration
*Since Oct. 2021*

UNIVERSITY OF COLOGNE, GERMANY

- Research on machine learning applications
- Research projects:
    - Reinforcement learning for inventory optimization
    - Effects of large language models on learning
    - Generative AI in design processes
- Relevant coursework: Machine Learning, Introduction to Reinforcement Learning & Deep Learning, Statistical Inference, Econometrics
- Expected graduation date: October 2025

### B.Sc. in Mathematics, Minor in Computer Science
*Apr. 2021 - Dec. 2023*

FERNUNIVERSITÄT HAGEN, GERMANY

- Average grade: 1.4

### M.Sc. in International Management (CEMS)
*Oct. 2018 - Jan. 2021*

UNIVERSITY OF COLOGNE, GERMANY

- Average grade: 1.2, among the top 5% of graduates

### B.Sc. in Business Administration
*Oct. 2015 - Feb. 2018*

UNIVERSITY OF COLOGNE, GERMANY

- Average grade: 1.2, among the top 1% of graduates

## Publications

Lehmann, M. The Definitive Guide to Policy Gradients in Deep Reinforcement Learning: Theory, Algorithms and Implementations. 2024. `https://arxiv.org/abs/2401.13662`

Lehmann, M., Cornelius, P., Sting, J. AI Meets the Classroom: When Does ChatGPT Harm Learning? 2024. `https://arxiv.org/abs/2409.09047`.

## Personal Research Projects

**AlphaZero & MuZero Re-Implementation** In this project, I propose using reinforcement learning with Monte Carlo tree search to finetune LLMs and I further target specific downstream applications.

**Deep Reinforcement Learning with Rewards from Vision-Language Models:** In this project, I train agents to fulfill arbitrary tasks formulated in natural language without hand-engineered reward functions. I use VLMs to ground the agent's environment in natural language and infer rewards as the basis for reinforcement learning training. `https://github.com/Matt00n/rl_from_vlm_preferences`

## Experience

### Meta
*Jun. 2025 - Sep. 2025*

MACHINE LEARNING ENGINEERING INTERN
*London, UK*

### Google X
*Mar. 2025 - May 2025*

RESEARCH SCIENTIST INTERN
*Mountain View, USA*

- Core contributor on confidential machine learning projects
- Techniques employed include LLMs, reinforcement learning and multi-agent systems

**University of Cologne**  *Oct. 2021 - May 2025*
TEACHING ASSISTANT  *Cologne, Germany*
- Supervision of bachelor's and master's theses
- Teaching graduate level courses: Python programming & machine learning course, supply chain research seminar
- Organizing committee of the international conference "CEMS Research Seminar on Supply Chain Management"

**FernUniversität Hagen**  *Oct. 2023 - Dec. 2024*
TEACHING ASSISTANT  *Hagen, Germany*
- Data Science and Data Mining Course
- Evaluating and giving feedback for course assignments and exams

**REWE**  *Apr. 2021 - Oct. 2021*
DATA SCIENCE INTERN  *Cologne, Germany*
- Developed a transformer-based classification model to automatically allocate 100,000 products based on their names to product groups with human-expert level accuracy
- Developed a machine learning model to forecast sales as control group for field experiments
- Research project on improving product availability through deep learning

**HKCF Corporate Finance**  *Feb. 2018 - Apr. 2018*
CONSULTANCY INTERN  *Cologne, Germany*
- M&A and debt financing projects

# Skills

| | |
|---|---|
| **Programming** | Python, LaTeX, SQL, Git |
| **Frameworks** | TensorFlow, Jax, GCP, NumPy, Pandas, HuggingFace |
| **Languages** | English, German |

# Honors & Awards

| | |
|---|---|
| Since 2021 | **PhD Scholarship: 75,000 €**, Cologne Graduate School in Management, Economics and Social Sciences |
| 2015-2020 | **Scholarship: 15,000 €**, "Deutschlandstipendium" for gifted students |
| 2006-2014 | **5-time award winner**, Mathematical Olympiad, state-wide round |
| 2006-2014 | **8-time award winner**, math competition "Mathematical Kangaroo" |

# Interests

- Tennis
- Chess
- Soccer
- Cooking